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GB A 2012737
GB 1392603
GB 1273495
GB 1190593
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(54) A lined drum

(57) A flexible bag-like liner 11 having a relatively thin wall is adapted to be connected to a wall portion 13 of a drum 10 with at least one port provided in association with the wall portion 13 so that fluid material may be introduced into the liner 11 and discharged therefrom; the wall portion 13 is adapted to be fitted substantially in sealing relationship with a body portion 12 of the drum with a sealable vent 17 being provided for discharging air from between the liner 11 and the interior walls of the drum 10 when fluid under pressure is introduced into the liner to urge the liner against the interior walls of the drum. A screw-threaded sealing plug for the vent prevents return of air and the arrangement is such that when the contents of the liner are partially discharged, a partial vacuum between the exterior of the liner and the interior of the drum retains the liner into contact with interior walls of the drum. The drum may be of the fixed head or open head type. A spigot 57 having a snap-engagement with the drum head is provided adjacent each liner port to resist twisting of the port during manual or attachment of a port closure.

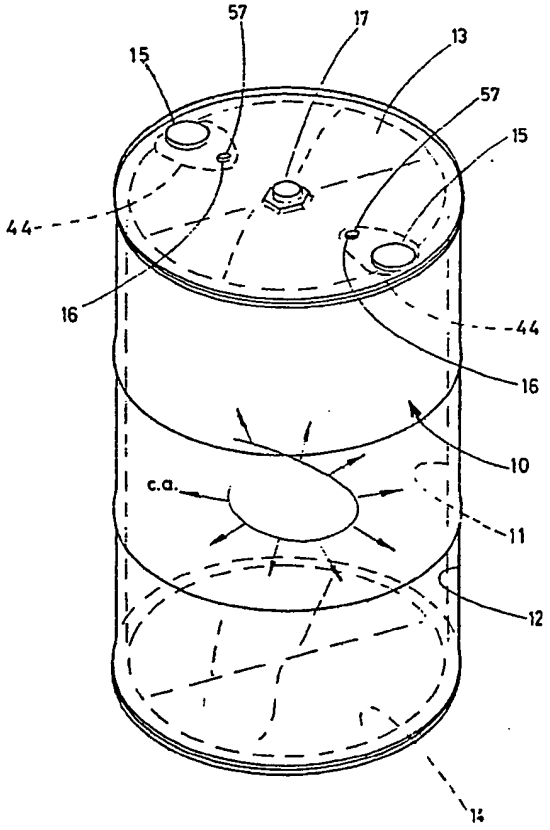

FIG. 1

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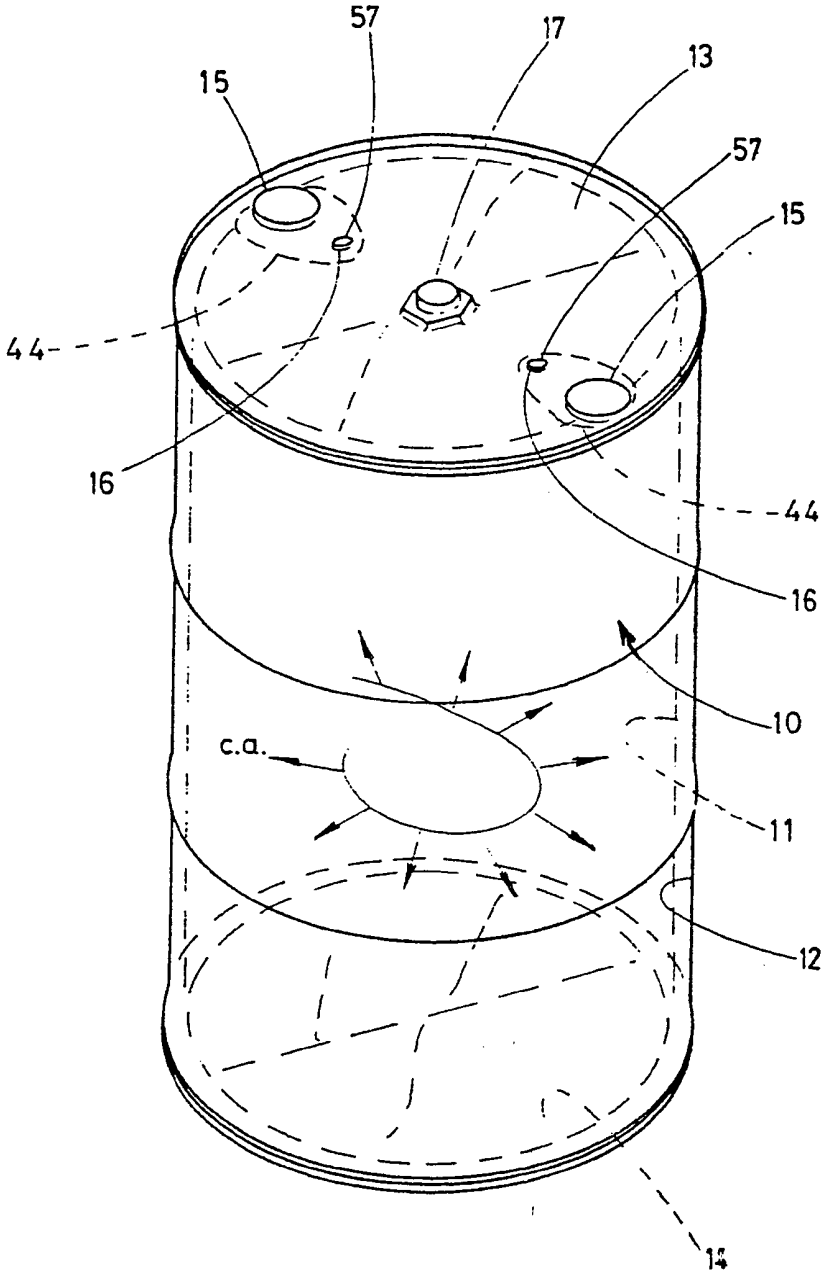

FIG. 1

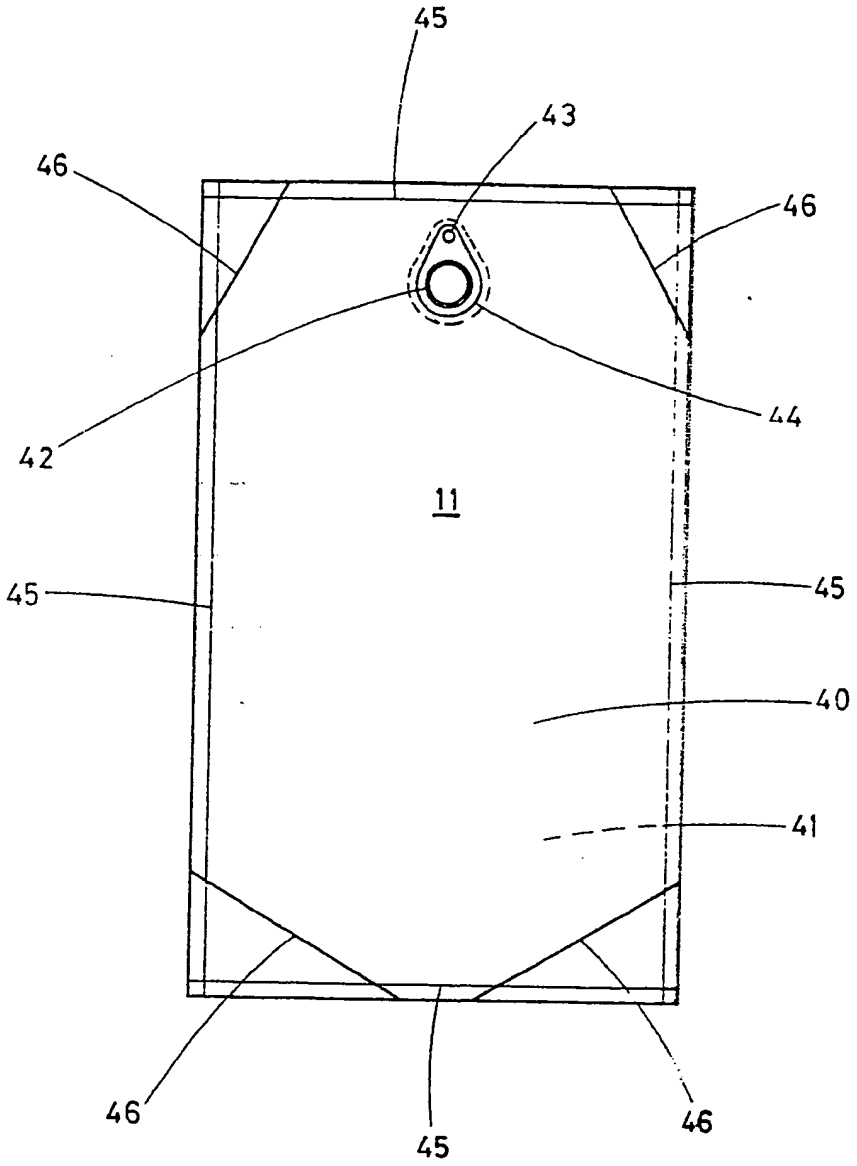

FIG. 2

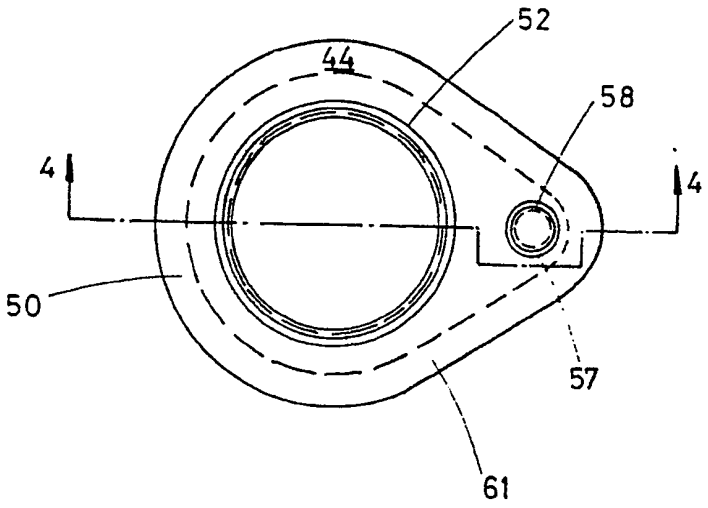

FIG. 3

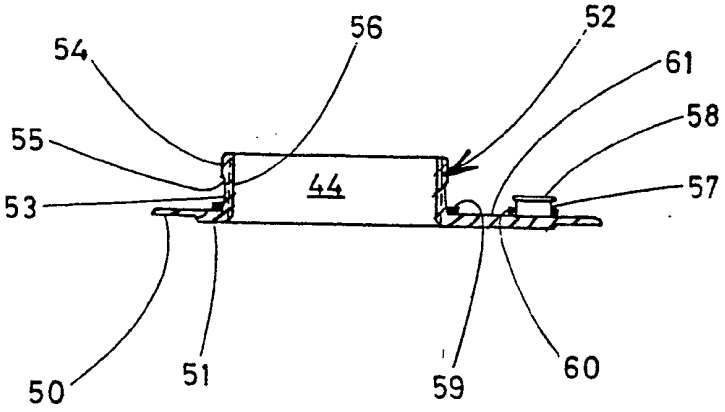

FIG. 4

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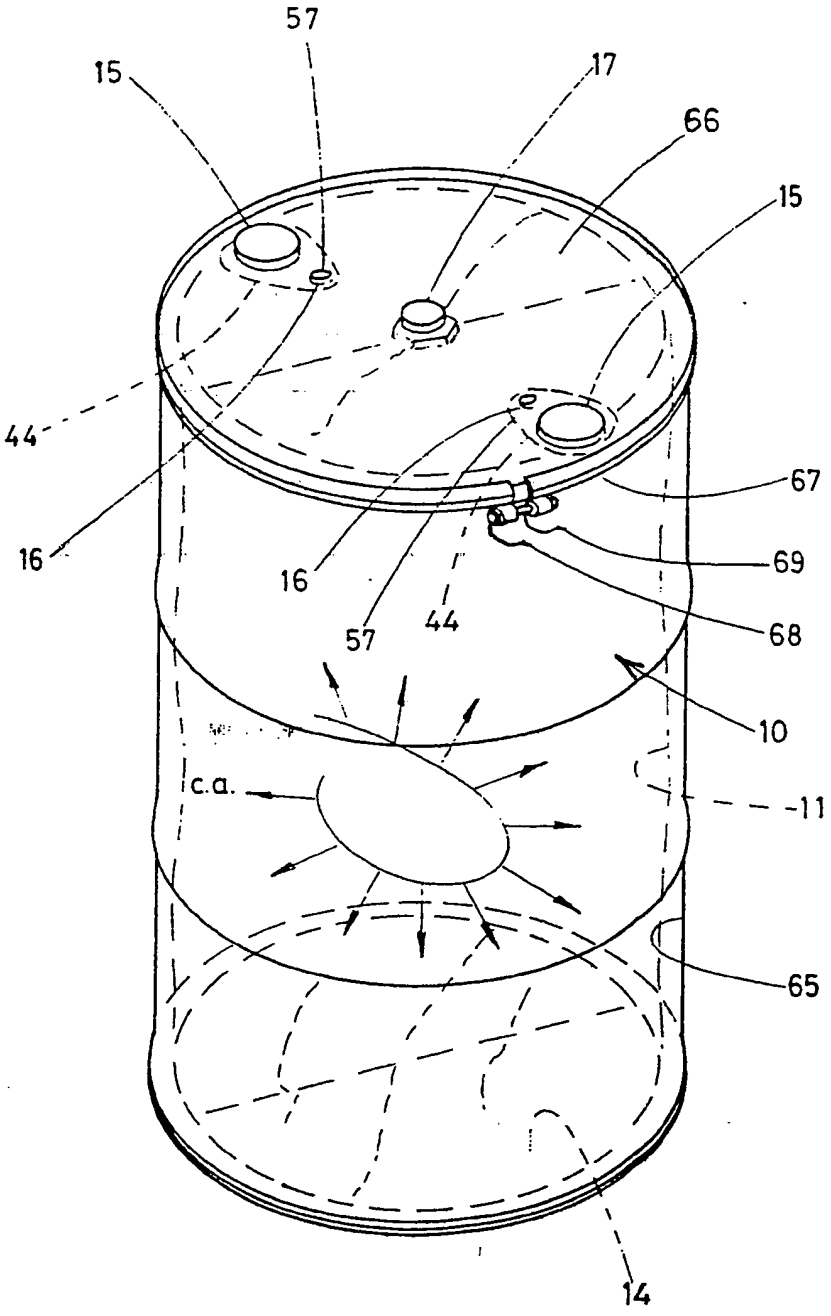

FIG. 5

SPECIFICATION

Lined receptacles

The present invention relates to lining arrangements for receptacles such as cylindrical steel drums or barrels or other containers for liquids or particulate materials.

Cylindrical steel drums conventionally have end walls sealingly fixed to a cylindrical side wall with flanges provided in one of the end walls receiving screw plugs so that the contents may be filled and discharged through the flanged openings. For many products a lining such as a plastic-type lining is required to protect the structure of the drum from contacting the contents. One known method of applying a suitable inert coating to the interior of such a drum is to melt a plastic coating onto the interior surfaces of the drum while rotating the drum at elevated temperature, a particulate supply of material for forming the plastic coating being first inserted into the drum.

Another approach has been to manufacture blow-moulded free-standing plastics liners which are placed inside the drum during its assembly and before the drum is shipped to the customer. Such liners, however, are expensive and a problem has existed with respect to the replacement of the liner when the drum is reconditioned. Since the liners are blow-moulded free-standing liners, the wall thickness is relatively large and rigid and thus transportation and storage of these liners is very expensive.

With this problem in mind, it has also been proposed to manufacture a liner which, although being relatively heavy and having a substantial wall thickness, is designed to be foldable to reduce storage and transportation volume. However, such liners have creases at the folds and these creases are difficult to remove and may initiate premature failure of the liner.

The limitations of the previous proposals are such that new and useful alternatives would be desirable.

According to a first aspect of the present invention there is provided, in combination, a wall portion for a closed receptacle adapted to be secured in sealed relationship with a body portion of said receptacle,

a flexible liner for lining the interior surfaces of said closed receptacle and adapted to prevent contents of the receptacle directly contacting its interior surfaces.

the flexible liner and said wall portion being interconnected and there being provided at least one closable fluid passageway communicating the interior of the liner with the exterior of the wall portion, and

air discharge means associated with said wall portion and adapted, after assembly of the closed receptacle, to discharge air from between the liner and the interior of the closed receptacle when fluid is introduced into the liner to expand the liner against the interior walls of the receptacle, the air discharge means being adapted to prevent ingress of air when contents of the lined receptacle are discharged, whereby the liner is urged into contact with interior surfaces of the receptacle.

One important application of the invention is to the case where the receptacle is a cylindrical drum, examples of this application being described hereinafter with reference to the accompanying drawings.

The invention extends to the combination of the wall portion and interconnected flexible liner installed within the body portion to form a lined, closed receptacle; in general, the air discharge means may be associated with any wall of the receptacle.

Preferably, the or each closable fluid passageway is provided by a gland of suitable material interconnected with the flexible liner and the gland is secured in an aperture in the wall portion thereby interconnecting the flexible liner and wall portion.

Most preferably the gland is a plastic moulding having a reduced external diameter neck portion extending away from the flexible liner to an enlarged head and the wall portion has its aperture provided by an outwardly projecting substantially cylindrical skirt-like structure of axial length corresponding to that of the neck of the gland, the neck of the gland being fitted by snap action by being pressed through the aperture whereby the peripheral tip of the skirt engages under the head of the gland. Exemplary embodiments of the invention including an example of such a gland as described hereinafter with reference to the drawings.

Advantageously, the flexible liner can be fabricated in the form of a pillow-like bag from flexible sheet material which can be of any suitable structure. Illustrative examples of useful structures are given hereinafter.

A second aspect of the invention concerns a method forming a lined receptacle wherein fluid pressure is used to press the flexible liner into intimate contact with the interior walls of the receptacle with air being discharged and a seal being established to prevent return of the air subsequently when contents of the liner are discharged. Compressed gas such as air is a highly convenient and effective technique for inflating the flexible liner and pressing it into position.

The invention can be most advantageously and economically implemented by the use of a thin-walled liner and, furthermore, for a given receptacle design, a range of liners suitable for different products can readily be provided. Furthermore, the nature of the liner permits a compact liner to be provided for storage and transportation purposes, yet a highly effective and reliable product can be achieved. By virtue of the combination of features according to the invention an effective and economic result can be achieved, the walls of the receptacle providing structural characteristics with the liner acting as a reliable barrier. By virtue of the liner being held in substantially intimate contact over the interior walls of the receptacle, the risk of liner damage due to relative movement between it and the interior walls is minimized.

Furthermore, when it is desirable to recondition a drum it can be a relatively simple process to fit a replacement liner after the receptacle has been opened by removal of the wall portion from the body portion.

For illustrative purposes only, examples of the invention will now be described with reference to the accompanying drawings of which:

Figure 1 is a perspective view of a receptacle with liner in accordance with a first embodiment of the invention;

Figure 2 is an elevational view of the liner used in Figure 1 but shown on a reduced scale;

Figure 3 is a plan view of a gland for the liner of Figure 2 but to an enlarged scale;

Figure 4 is a cross-sectional view on the line 4-4 of Figure 3; and

Figure 5 is a perspective view of a second embodiment of a receptacle with a liner therein.

Figure 1 shows a receptacle in the form of a cylindrical steel drum (10) having installed therein a flexible plastic liner shown in more detail in Figure 2 and secured to a top end wall (13) of the drum by two plastic glands (44) shown in more details in Figures 3 and 4. The drum (10) is of conventional form and has a sheet metal side wall (12) having at each end an outwardly directed bead with which the top and bottom end walls (13 and 14) are interconnected by a sealed seam effected by rolling.

On diametrically opposite sides of the top end wall, there are a pair of large openings (15) and small openings (16) respectively provided by axially outwardly directed skirts having a sharp shoulder with which the glands (44) are fitted as described in more detail below. Centrally located in the top end wall (13) is a venting opening (17) fitted with a screw-threaded flange for accommodating a screw-threaded sealing plug which is not shown in the drawing. The flange has a polygonal shoulder accommodated in a corresponding shaped interior recess in the end wall for providing torque resistance.

The liner (11) shown in detail in Figure 2 is of bag-like form and is illustrated when laid out flat and viewed in elevation, the respective sides being similar and comprising front and back panels (40, 41) having respective apertures around which a respective gland (44) is attached as described below, the panels being heat sealed together along their respective edges (45). Furthermore, to facilitate discharge of liquids from the liner when installed in a drum, liquids are preventing from reaching the corners of the bag-like structure by provision of subsidiary heat seals (46) directed across the corners of the bag.

The panels (40, 41) can be of any suitable material which may be plastic film (either single ply or multi-ply structure) or if desired may be of or include laminated materials. For example, good results have been obtained from the use of a single ply laminated sheet of about 125 microns thickness with the inner layer of the panel being polyethylene about 100 microns thick and the outer layer being about 25 microns thick and of nylon. Another useful structure is obtained by a laminate having an interior layer of polyethylene film of about 50 microns thick and the outer layer itself being a laminate about 75 microns thick. This outer layer can be a laminate structure having the layer directed towards the inner layer of the panel being of polyethylene and about 50 microns thick whereas the outer layer of this laminate facing the exterior of the liner being about 25 microns thick and of the nylon.

Referring now to Figures 3 and 4, each gland (44) is an injection moulded component of thermoplastic material such as polyethylene and has a pear-shaped base (51) from which a pear-shaped outwardly directed flange (50) projects so that a portion of the panel (40 or 41) surrounding its opening may be welded to the underside of the flange (50).

An upstanding internally screw-threaded cylindrical projection (52) extends from the base (51) and has a reduced diameter the neck (53) terminating in a shoulder (55) and leaving a larger diameter head (54). This cylindrical projection can be fitted with a screw plug to close the bag and particulate or liquid material can be introduced into the bag or discharged therefrom readily.

A relatively small diameter upstanding spiggot (57) also extends from the base (51) and is hollow but is integrally formed with a top cap (58) which provides an outwardly directed enlarged head for the spiggot. The spiggot (57) and the cylindrical projection (52) carry respective O-ring seals (60 and 59) and each gland (44) is fitted and secured to the top end wall (33) by snap-fitting respectively the projection (52) and spiggot (57) through the openings (15 and 16). The upstanding skirt defining these openings snap-fits over the head (54) of the projection (52) and over the top cap (58) of the spiggot (57) to engage tightly and establish a seal. The spiggot (57) has a torque resisting function when a screw plug is inserted or removed from the cylindrical projection (52).

Figure 5 shows a second embodiment in which like parts have been given like reference numerals, the distinction of the embodiment of Figure 5 being that an alternative configuration is provided for attachment of the top end wall (66) to the side wall (65). Whereas the drum of Figure 1 is known as a "closed head drum" the drum of Figure 5 is known as an "open head drum" since the top end wall (66) is simply clamped into position, the periphery of the top end wall having a rolled over skirt which engages over a corresponding outwardly directed bead at the top end of the side wall (65); a clamping ring (67) is fitted over the assembly and tightened by means of a nut (68) and bolt (69). It is best to locate some sealing material between the faces of the end wall (66) and side wall (65) which are to contact one another.

Assembly of the combination of the receptacle with the liner in both the described embodiments is similar in that the liner (11) is secured by snap-fitting the glands (44) through the respective openings in the top end wall for the drum, the glands being located so as to be within the drum when assembly is completed and then the top end wall with the attached liner is secured to the side wall of the drum.

A screw-threaded plug is sealingly engaged in one of the glands and compressed air introduced through the other gland to expand the liner as generally indicated in Figures 1 and 5 by the arrows and the reference "c, a" referring to compressed air. Figures 1 and 5 show the line just before complete

expansion has occurred. Air from between the liner and the interior of the drum wall escapes through the opening (17) as the liner is expanded and when the liner has been pressed into intimate contact with the interior walls of the drum, a closure plug is screw-threadably engaged in the opening (17) to prevent return of air.

The liner may now be filled with contents and upon subsequent discharge of the contents a partial vacuum is maintained so that the liner is retained in substantially intimate contact with the interior surface of the drum.

The invention can be applied to embodiments in which the liner is adapted to hold contents within a large range, for example 10 litres to 300 litres. The material chosen for the glands and the liner is selected to suit the material to be packaged, polyethylene being readily available, useful and relatively cheap material for many purposes but may be substituted where required to suit specific products.

CLAIMS

1. Apparatus for use in forming a closed lined receptacle (10), the apparatus comprising

a wall portion (13) for connection in sealed relationship with a body portion (12) of the receptacle,

a flexible liner arranged for interconnection with said wall portion and (11) for lining the interior surfaces of said closed receptacle (10) and adapted to prevent contents of the receptacle directly contacting its interior surfaces,

at least one closable fluid passageway (52) communicating the interior of the liner with the exterior of the wall portion,

and air discharge means (17) associated with said wall portion (13) and adapted, after assembly of the closed receptacle, to discharge air from between the liner and the interior of the closed receptacle when fluid is introduced into the liner to expand the liner against the interior walls of the receptacle, the air discharge means being adapted to prevent ingress of air when contents of the lined receptacle are discharged, whereby the liner is maintained in contact with interior surfaces of the receptacle.

2. Apparatus as claimed in claim 1, and wherein said air discharge means comprises a screw-threaded aperture provided in said wall portion and adapted to be closed by a screw plug.

3. A closed receptacle (10) comprising a substantially rigid body portion (12) and a substantially rigid wall portion (13) secured to the body portion in sealing engagement, a flexible liner (11) lining the interior surfaces of the closed receptacle for preventing contents of the receptacle directly contacting its interior surfaces, the flexible liner (11) being interconnected with said wall portion and at least one closable fluid passageway (56) communicating the interior of the liner with the exterior of said wall portion, airflow control means (17) being provided in the receptacle for controlling air communication between the exterior of the receptacle and a region within the receptacle exterior of said liner, the airflow control means being operable to permit a discharge of air when the liner is expanded under internal fluid pressure to engage in intimate contact with the interior walls of the receptacle and to prevent the ingress of air when contents are discharged from the liner through said closable fluid passageway.

4. A receptacle as claimed in claim 3, wherein said air-flow control means (17) comprises a screw-threaded opening in said wall portion, a screw-threaded plug being provided for closing said opening.

5. Apparatus as claimed in any one of the preceding claims, wherein the or each closable fluid passageway is provided by a gland (44) of suitable material interconnected with the flexible liner (11) and the gland is secured in an aperture (15) in the wall portion (13) thereby interconnecting the flexible liner and wall portion.

6. Apparatus as claimed in claim 5 and wherein said gland is a plastic moulding having a reduced external diameter neck portion (53) extending away from the flexible liner to an enlarged head (54) and the wall portion has its aperture (15) provided by an outwardly projecting substantially cylindrical skirt-like structure of axial length corresponding to that of the neck of the gland, the neck of the gland being fitted by snap action by being pressed through the aperture whereby the peripheral tip of the skirt engages under the head of the gland.

7. Apparatus as claimed in claims 5 or 6, and wherein said gland has an internal screw-threaded neck (56) for receiving a closure plug and a torque resisting element (57) in the form of a projection extending from a base portion (51) of the gland and engaging in a corresponding recess (16) in said wall portion.

8. Apparatus as claimed in any one of claims 5-7, wherein two of said fluid passageways are provided by a respective said gland (44), the two glands being interconnected with the wall portion on opposite sides thereof.

9. Apparatus as claimed in any one of the preceding claims, wherein said flexible liner comprises a sheet of plastics film formed into a bag-like structure.

10. Apparatus as claimed in any one of the preceding claims, wherein said liner comprises at least one sheet of flexible laminate material formed into a bag-like structure.

11. Apparatus as claimed in claim 10, and wherein said laminate has a thickness of about 125 microns.

12. Apparatus as claimed in claim 11, and wherein said laminate has an interior layer of about 100 microns thick and of polyethylene and an exterior layer of about 25 microns thick and of nylon.

13. A method of forming a lined receptacle (10) comprising taking a wall portion (13) for the receptacle and connecting it to a body portion (12) of the receptacle in a substantially sealed arrangement thereby forming a closed receptacle, said wall portion having attached thereto a flexible liner (11) for lining the interior surfaces of the closed receptacle with at least one closable fluid passageway (56)

communicating the interior of the liner to the exterior of the wall portion and air discharge means (17) being associated with the receptacle, applying fluid under pressure into the liner and discharging air from between the liner and the interior of the receptacle through said air discharge means thereby pressing the liner against the interior walls of the receptacle and substantially preventing return of air between the liner and said interior walls of the receptacle whereby when the receptacle is in use and contents are discharged from the liner, the liner remains urged against said interior walls of the receptacle.

14. A method as claimed in claim 13, wherein compressed gas is used as the fluid to inflate the liner.

15. A method as claimed in claim 13 or 14, and wherein said air discharge means comprises a screw-threaded flange secured in a wall of the receptacle, a sealing plug being inserted to prevent return of air.

16. A method of forming a lined receptacle as claimed in claim 13 and substantially as hereinbefore described.

17. A lined receptacle formed by the method of any one of claims 13 to 16.

18. Apparatus for use in forming a closed lined receptacle substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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